

U. S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE  
California Forest and Range Experiment Station  
Division of Forest Insect Research

FOREST INSECT CONDITIONS  
CONNESS BASIN  
YOSEMITE NATIONAL PARK  
SEPTEMBER, 1954  
APPRAISAL SURVEY

INTRODUCTION

Since 1945, a definite increase in populations of the lodgepole needle miner, Recurvaria milleri Busck, in lodgepole pine has been in progress in the north-eastern part of Yosemite National Park. By 1953, Hall and Wickman <sup>1/</sup> estimated that the needle miner infestation extended over some 45,000 acres (see attached map). Past experience with this insect, dating back to the early 1900's, has found that large-scale buildups of needle miner populations have occurred periodically. These periodic needle miner buildups have caused heavy defoliation of the lodgepole pine over wide areas and thereby predisposed the trees to attack by the mountain pine beetle, Dendroctonus monticolae Hopk. The ensuing losses due to the mountain pine beetle have been devastating and extensive, and have resulted in what has come to be commonly known as "ghost forests." At the present time, a similar situation is developing within Conness Basin and McCabe Basin, both of which are north of Tuolumne Meadows, a heavily used vacationist area.

The first evidence of large-scale mountain pine beetle losses within the current lodgepole needle miner area was reported from Conness Basin during the summer of 1953 by Hall and Wickman <sup>2/</sup>. This led to an appraisal survey of the Conness Basin area in late August 1953. The appraisal survey found that an epidemic situation existed, and recommendations were set forth for a control project. During the period from late May to mid-July, 1954, a control project was undertaken in Conness Basin. Many difficulties arose which resulted in an incomplete treatment of the area. Approximately three-fourths of the infested trees were treated during the course of this control operation.

From August 31 to September 3, 1954, an appraisal survey of Conness Basin was made by G. L. Downing and A. G. Samuelson. Although fresh attacks were still occurring within the area at this time, it was felt that the survey could not be delayed any further, owing to the need for information on losses before it became too late in the year for control work.

INSECT AND HOST SPECIES

The only host involved is lodgepole pine, which occurs over most of the area in pure stands. There are a few slopes which contain a mixture of lodgepole pine, western white pine, western hemlock, and red fir; however, the heaviest losses from the mountain pine beetle have occurred in pure lodgepole pine stands.

<sup>1/</sup> Hall, R.C. and B. E. Wickman - Lodgepole needle miner, Yosemite National Park, California, July 1953. Appraisal Survey, CF&RES, Berkeley, Calif. January 18, 1954

<sup>2/</sup> Hall, R.C. and B. E. Wickman - Mountain pine beetle, Conness Basin, Yosemite National Park, August 1953, Appraisal Survey. BE&PQ, Forest Insect Lab., Berkeley, Calif., October 29, 1953

Observations within the present mountain pine beetle infestation and in areas of heavy past loss indicate clearly that mountain pine beetle broods can be expected to become most destructive in pure stands comprised mainly of mature and overmature lodgepole pine. At the present time this would include the following areas which fall within the known lodgepole pine needle miner area:

1. Conness Basin
2. McCabe Basin
3. Dingley Creek
4. Delaney Creek
5. Tuolumne Meadows

#### STATUS AND SCOPE OF INFESTATION

The mountain pine beetle infestation in Conness Basin has increased in size over last year from 500 acres to approximately 750 acres. To supplement existing information on needle miner activity and associated damage by the beetle, a ground reconnaissance trip was made through the northern half of Yosemite National Park in August, 1954. The areas of needle miner infestation examined were those that had been delineated in aerial surveys of the Park in 1953. The reconnaissance survey revealed that an epidemic mountain pine beetle infestation now exists in McCabe Basin at the head of Alkali Creek. (See attached map.) The bulk of this area is separated from Conness Basin by one ridge; however, there is a contiguous strip of timber connecting the two basins. A moderate amount of loss is occurring within the McCabe Basin area. Other mountain pine beetle activity found on this reconnaissance survey is as follows:

1. Rodgers Canyon -- This area has been under attack by the mountain pine beetle since the mid-thirties and most of the lodgepole has been killed. It is an extremely remote area and control is not warranted.
2. Delaney and Dingley Creeks -- In the upper reaches of these two drainages endemic loss is occurring, and there are definite signs of an upswing in mountain pine beetle populations. This entire area is visible from Tuolumne Meadows and is considered as the next most logical place to fall under attack by the mountain pine beetle. Maintenance control in this area, combined with control projects in Conness Basin and possibly in McCabe Basin, may prevent this from happening.

#### APPRAISAL SURVEY FINDINGS

The Conness Basin infestation area was sampled in much the same manner as in 1953; namely, by means of 1/2-acre circular plots spaced 4 chains apart on lines 10 chains apart. A total of 162 plots, or 81 acres, were sampled within the estimated 750 infested acres. This amounts to an 11 per cent cruise. On each plot, all trees containing broods of the mountain pine beetle were tallied by diameter, and the brood stages noted for every infested tree on every fifth plot. Although no statistical information has been worked up for the brood stages found at the time of the survey, it is apparent from the data that new attacks predominate. Most of the broods are now in the egg to 0-1/2-grown larva group.

The number of currently infested trees on the 750 acres is  $3,945 \pm 383$ . The sampling error of this estimate is 9.7% at the 68% confidence level. The total number of trees infested by the time a control project might be undertaken will be slightly higher because of new attacks which will have occurred following completion of the appraisal survey.

Following is a breakdown, by diameters, of the currently infested trees tallied on the 162 one-half-acre circular plots:

D.b.h.:	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
No. of trees :	10	39	39	53	63	59	37	42	32	19	7	12	6	5	2	1

Average d.b.h. for the entire sample is 20.08 inches.

#### DISCUSSION

The appraisal survey shows that the incomplete control project of June and July 1954 in Conness Basin did not reduce the infestation. There are at present approximately twice as many currently infested trees in Conness as were found at this same time last year. In addition, the size of the infestation area has expanded considerably.

With the general reconnaissance of northern Yosemite Park completed, and the finding of a new infestation at McCabe Basin, we are now aware of the more serious problems adjacent to the high use areas of Tuolumne Meadows. The National Park Service has expressed a desire to keep the mountain pine beetle infestation out of the Tuolumne Meadows area and would justify any control work on that basis. This leaves us with the question of whether or not it is entomologically sound to go ahead with further control projects based on the information we now have at hand. It is generally agreed that losses from the mountain pine beetle will occur in mature lodgepole pine stands whenever those stands have been excessively defoliated over a period of time by the lodgepole needle miner. This brings up several points for consideration:

- (1) What are the chances for a natural decline in needle miner activity?
- (2) What are the possibilities of controlling the needle miner through the use of insecticides?
- (3) Can the mountain pine beetle population be held to a controllable size until either natural control has taken effect or artificial control has been devised?

To answer any or all of these questions absolutely is not possible, but an answer can be given as to what might be expected to happen.

Needle miner populations have increased steadily since 1945, and at present are probably the highest that they have been during the current epidemic. Past experience has shown that needle miner populations build up to a high point over a period of years and then subside. This fluctuating characteristic is not

necessarily constant, but in past epidemics no high level of needle miner populations has prevailed over any extended period of time in the same area. With this in mind, it would not be out of line to expect that current high populations of the needle miner would tend toward a decline in the near future.

Studies undertaken this past season relating to natural control factors have not yet been reported upon, but have shown that there is a definite correlation between certain natural occurrences and needle miner population trends. Natural parasitism, although present throughout the entire infestation area in varying degrees, has not shown signs of becoming a definite controlling factor.

The use of insecticides to control needle miner populations has for some time been a topic of considerable discussion. Based on the best available information at the time, an experimental spray application of DDT was tried over several thousand acres in 1953. This spray application was not effective. At the present time, tests on a small scale are being conducted to determine the possibilities of several of the newer insecticides. However, for the moment at least, there is nothing to indicate definitely that any of the insecticides will be of value in controlling the needle miner within the next season or so. Final results of these tests will soon be available, however.

As to the possibilities of holding mountain pine beetle populations to a controllable size or smaller -- this will depend upon several factors. There are three areas to be considered in which control in some form should take place immediately or in the near future if it is undertaken at all. These are Conness Basin, McCabe Basin, and the Dingley Creek-Delaney Creek drainages. Conness Basin is at present the most important area because of the threat that it poses to Tuolumne Meadows. Therefore the first control projects would have to be carried on here. The next logical step would be a maintenance control program within the entire Tuolumne Meadows area, including the Dingley-Delaney Creek drainages. This would be necessary to prevent any serious spot flare-ups of the mountain pine beetle within the zone the Park Service is trying to protect. Much of the lodgepole surrounding Tuolumne Meadows is heavily infested by the needle miner, and mountain pine beetle populations could build up to tremendous proportions in the weakened trees unless some form of maintenance control is undertaken. McCabe Basin is not a direct threat to Tuolumne Meadows, but is a serious indirect threat because of its close proximity to Conness Basin. Because of this situation, any proposed control program would have to take into consideration the necessity of a control project in McCabe Basin. This should take place either concurrently with a project in Conness Basin or soon thereafter.

From the foregoing discussion it appears that there are two courses of action: either to get out and let the beetles do their damage, or go ahead with an all-out control effort. An all-out effort would, under favorable conditions, culminate in a satisfactory conclusion and protection of the Tuolumne Meadows high-use recreational area, as desired by the Park Service. To withdraw from the project at this time could, within a year or two, lead us into the unenviable position whereby we could only look at wholesale destruction and say that we could have attempted control when beetle populations were at a relatively low level.

is down to  
of the Park Service that control of M.p.b. should be undertaken the following areas  
RECOMMENDATIONS  
Control methods.

It is recommended that:

1. A control project be undertaken this fall in the Conness Basin area. The standard fell-burn method should be employed with experimental use of ethylene dibromide on a small scale. The latter method should be tried to test the feasibility of using this material for mountain pine beetle control, particularly in remote areas.
2. A maintenance control program be set up to include treatment of infested trees within the Tuolumne Meadows area, including Dingley and Delaney Creeks. This would be a rather small undertaking with but few trees involved, all of which should be fairly accessible.
3. An appraisal survey of McCabe Basin be made by this Station as soon as time allows.
4. A control project be planned for the McCabe Basin area as soon as the appraisal is completed. This project should take place in the spring or fall of 1955.
5. A reconnaissance survey of the entire Tuolumne Meadows area be made by this Station during the summer of 1955. This survey is needed to keep abreast of any new developments within this area.

Berkeley, California  
September 17, 1954

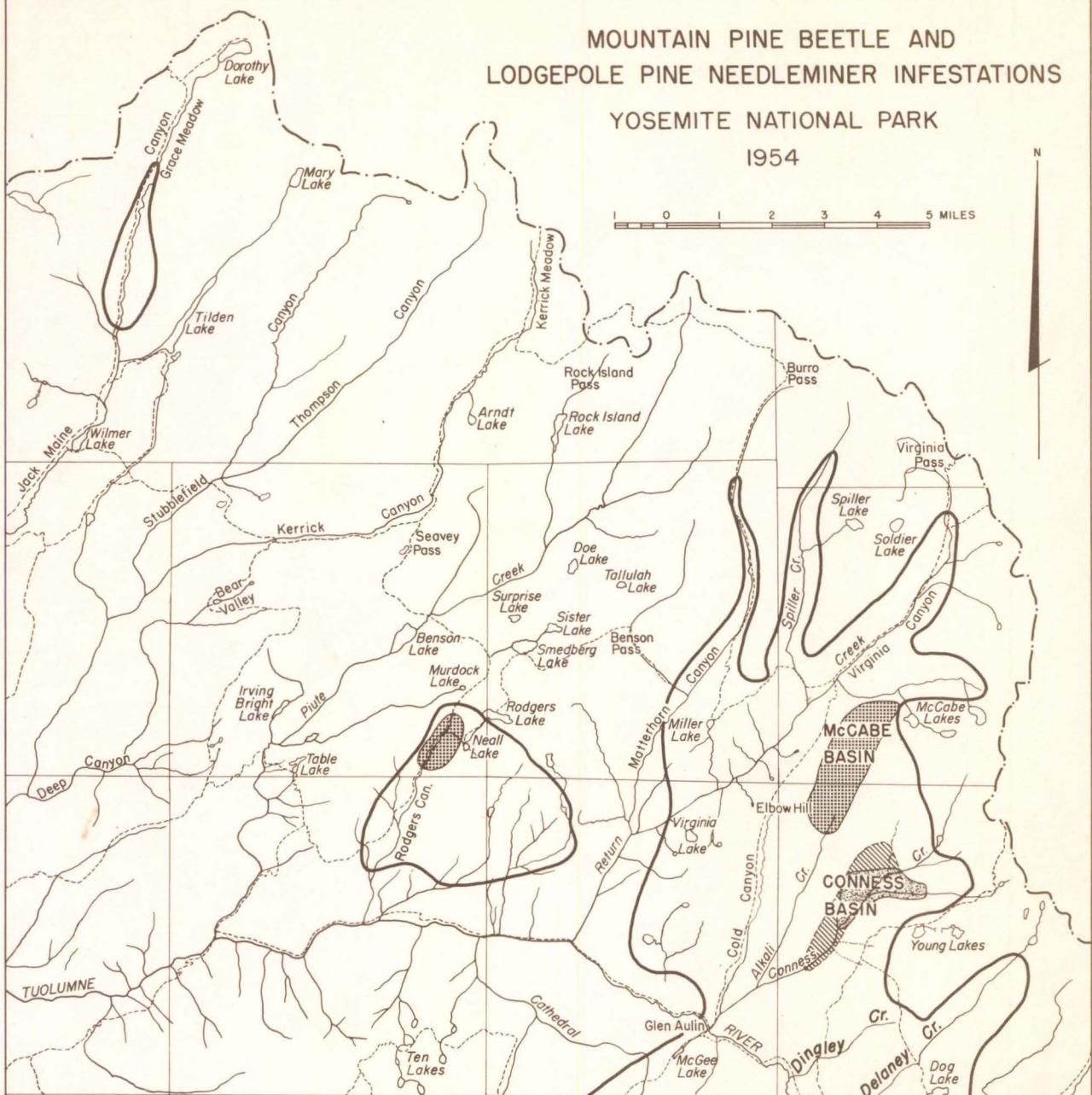
G. L. Downing  
Entomologist

MOUNTAIN PINE BEETLE AND  
LODGEPOLE PINE NEEDLEMINER INFESTATIONS  
YOSEMITE NATIONAL PARK

1954

1 0 1 2 3 4 5 MILES

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## LEGEND

Boundary of Lodgepole Pine  
Needleminer infestation



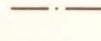
Conness Basin Mountain Pine  
Beetle Control Project, May -  
July 1954.



Proposed extension of Conness  
Basin Control Project



Other known Mountain Pine  
Beetle infestations



Park boundary

